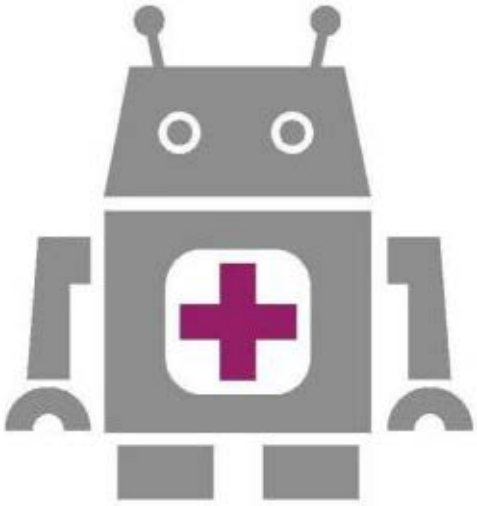
COST Workshop on Social Robotics

The future concept and reality of Social Robotics: challenges, perception and applications

The role of Social Robotics in current and future society



Workshop Booklet

Monday 10 - Thursday 13 June 2013
International Press Centre (IPC), Résidence Palace
Brussels, Belgium

http://www.cost.eu/events/socialrobotics
#socialrobots

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Introduction

Social Robotics deals with the use of robotics in all domains of everyday life such as domestic care and work, healthcare, education, information, communication and entertainment. As such, it is a highly interdisciplinary research area of strategic importance for Europe. Although research on robotics can be traced back to antiquities, it is only in the last few years that robots are increasingly being incorporated into policy discourse and have found important commercial applications.

As an emerging trend, research on social robotics has also acquired a certain maturity and has developed a remarkable level of inter-disciplinarity by putting together researchers from diverse disciplines such as artificial intelligence, cognitive psychology, electronic engineering and medicine. Until now, only sporadic attempts to create a more complete disciplinary convergence have been put forward. As a result, a trans-disciplinary community of social robotics scholars still needs to be established and research groups working in this area are still quite fragmented and dispersed.

Starting from these premises, it became clear that COST Domain Committees could join forces to make this ambitious plan happen. This resulted in the collaborative effort between three Domain Committees, namely ISCH (Individuals, Societies, Cultures and Health), ICT (Information and Communication Technologies) and BMBS (Biomedicine and Molecular Biosciences).

In particular, this workshop aims to advance the creation of such a trans-disciplinary community by better integrating into the discourse disciplines such as the social sciences and humanities. This is particularly important in consideration of the important role that robots and robotics applications are expected to play in tackling societal challenges such as global ageing and sustainable welfare. This strategic workshop represents a platform through which researchers can share knowledge and gain an understanding on the different ways social robotics is perceived and accepted in various cultural contexts and by different research communities, as well as on the range of challenges and applications connected to human-robot interaction.

As social robotics is moving from the stage of experimentation and prototypization to the stage of mass diffusion, it is the right moment to present innovative research and to illustrate the latest scientific, sociological, psychological and philosophical advances in the field. Special attention will be given to socially appealing design methodologies, ergonomics in human-robot interactions, intelligent control, decision making, three parties interaction (between robots, humans and environments), multimodal sensor communication, safety, application of models of human and animal social behaviour to robots and to context awareness, expectation and intention understanding. The workshop will also emphasize the study of citizens' perception and acceptance of social robots, as well as key applications of social robotics in various domains of everyday life.

In addition to giving an overview of the current state of the social robotics scene, another important goal of the workshop is to envisage the development and role of social robots in future society. This input represents an important aspect to be considered by policy makers, private organisations and all other relevant stakeholders.

In brief, the outcomes of the strategic workshop are expected to:

a) Summarize the state-of-the-art of research on social robots

b) Advance the trans-disciplinary knowledge on the technical and social implications of social robots as well as advance our understanding of social robots as cultural objects

c) Produce an integrated knowledge on social robots

d) Outline an agenda of future research and propose ideas of future applications in the material and immaterial reproductive sphere (housework, education, entertainment, gaming, health-care), to be developed through a series of research collaborations.

We wish you a pleasant and inspiring COST Workshop on Social Robotics.

Leopoldina Fortunati

On behalf of the Organising Committee

COST Domains involved

COST Domain ISCH
Individuals, Societies, Cultures and Health

ISCH supports the development of knowledge and insights for citizens, democratic debate and decision-making in the public, private and voluntary spheres.

The following examples illustrate aspects of potential research topics in this Domain.
The conceptual scope of the Domain is not restricted to these themes or areas.

Science, innovation and economy
Knowledge society; economic development; social cohesion; human capital and creativity; entrepreneurship; poverty and inequality management; labour markets; work and leisure; welfare regimes; etc.

Media and technology
E-learning, audience studies, media sociology, cultures of communication, etc.

Histories, cultures and identities
Cultural diversity in Europe including languages, literatures, music and art; regional/national histories and European history; media and communication; values, continuity and change; material cultures; people and landscapes/cityscapes; locational and spatial variation; cultural heritage; cultures of food and drink; philosophies of humans, nature, science and society; popular cultures, etc.

Law, policy and politics
Governance and citizenship; public safety and security; human impact on the environment; war and conflict; international and inter-group relations; risk and regulation; institutional and organisational frameworks; social policy; demographic change and migration; etc.

Health, education and individual development
Mind, cognition and complexity; language development; learning; creativity; socialisation; identities and attitudes; gender; human well-being; decision-making and risk-taking; health and well-being; families and parenting; intergenerational relations; education and skills development; etc.

Inter-disciplinary topics linking social science/humanities perspectives are also welcomed by this Domain in so far as the social science/humanities aspect is predominant.

For further information please visit: http://www.cost.eu/domains_actions/isch

COST Domain ICT
Information and Communication Technologies

ICT covers scientific and technical research in all areas of information and communication science and technologies.

In general, the term ICT refers to a combination of technologies and services for capturing, storing, transmitting, displaying data and information electronically. The scope of the ICT Domain is actually broader and by definition multi-disciplinary, encompassing a wide range of scientific areas, with emphasis on emergent fields, pre-competitive technology development and standardization activities. The following research areas are covered by the ICT Domain. Nevertheless, the scope of the Domain is not restricted to such activities, on the contrary, open to new ideas and initiatives

Information science and technologies

This area includes all the aspects related with the foundations, design, analysis, development, and application of hardware and software systems. Related areas are computer science, software development technologies, software engineering, intelligent and expert systems, advanced interfaces, user aspects, information management, high performance computing and embedded systems.

Telecommunications

Research in this area concentrates on fundamental aspects and applications regarding physical, electromagnetic and functional modelling of all elements of information and communication systems such as terminals, antennas, transmission channels and propagation, as well as optical components (e.g. photonic devices), networking aspects, wireless mobile communications and the Future Internet.

Societal aspects of ICT

This area covers both the influence of ICT on society (technology push) and the requirements imposed by society on the ICT infrastructure and services (market pull). Interdisciplinary cooperation with other disciplines dealing with societal needs is instrumental for the development of this research area. In fact, this area is characterized by the use of ICT as enabling technology for the benefit of society, in fields like sustainable development, ambient assisted living, e-health, energy efficiency, e-learning, bioinformatics and many others.

For further information please visit: http://www.cost.eu/domains_actions/ict

COST Domain BMBS
Biomedicine and Molecular Biosciences

BMBS covers all areas of medicine as practiced in Europe and basic, preclinical and clinical medical research developed to materialise the “bench to bedside” concept.

The following examples illustrate aspects of actual research in this Domain. The scope of the Domain is not restricted to these activities; it should be noted that networking of cutting edge specific research with a high degree of complexity and multidisciplinarity is encouraged.

Molecular Biosciences

They encompass all areas of genomics, proteomics and metabolomics. They are not limited to research in humans, but may also concern research in plants, viruses, micro-organisms, and animals. Basic and applied biomolecular research is addressed, issues connected with forestry and agriculture included. The BMBS research also includes issues of genome, proteins (structures and functions), lipids, study of the Central Nervous System and neuronal connections, cognitive neuroscience, immune system, cell migration, cell dysfunctions (cancer), cellular mechanisms of diseases, contagious diseases (animals to humans transmissible diseases included), tropical diseases.

Biomedicine and Specific Technologies

Some of the related BMBS research areas include advanced imaging and treatment techniques (basic research, diagnosis, treatment procedures), medical devices and new medicines, advanced medical research on biomaterials.

Micro- and Nanomedicine

(Including nanotechnologies), biomedicine/ molecular bioscience and pharmacology in extreme conditions such as climate change, and outer space conditions.

Research in BMBS is also concerned with some crucial interdisciplinary issues in the fields such as bioinformatics, biomedical engineering, medical physics and chemistry, mathematical models in medicine. Therefore, new ideas and initiatives are welcome as well as those with high interdisciplinary elements, high degree of innovation and close links and overlaps with other domains.

For further information please visit: http://www.cost.eu/domains_actions/bmbs

Programme

Monday 10 June 2013

Hotel NH Du Grand Sablon, Rue Bodenbroek 2/4, 1000 Brussels (BE)

17.30 – 19.00: Workshop Registration

19.00 – 19.30: Welcome words by **COST representatives**

19.30 – 20.00: **Gian Piero Brunetta** (University of Padua, IT) “Robots in the cinema”

20.00 – 22.00: Dinner

Tuesday 11 June 2013

International Press Centre, Rue de la Loi 155, 1000 Brussels (BE)

8.30 Workshop Registration

9.00 – 13.00: Plenary Session (Polak Room) - Chair: Leopoldina Fortunati (University of Udine, IT)

9.00 – 9.15: Official Opening by **Tatiana Kovacikova**, COST Office Head of Science Operations

9.15 – 9.30: Workshop Introduction by **Leopoldina Fortunati**, Head of the Organising Committee

9.30 – 10.00: **Anne Bajart** (EC/DG Connect A2 Robotics) “The EU-funded research programme in robotics: achievements and perspectives”

10.00 – 10.30: **Fabrizio Sestini** (EC/DG Connect) “Collective Intelligence, Internet Ethics and Sustainability: Issues for Social Robots”

10.30 – 11.00: **Sakari Taipale** (University of Jyväskylä, FI) “European perceptions of robots and related implications for the policies of the social”

11.00 – 11.30: Coffee break

11.30 – 12.00: **Atsuo Takanishi** (Waseda University, JP) “Some Aspects of Humanoid Robot Design”

12.00 – 12.30: **Antonio Bicchi** (University of Pisa, IT) “From Social Robots to Societies of Robots”

12.30 – 13.00: **Naomi Baron** (American University Washington D.C., US) “Shall We Talk? Conversing with Humans and Robots”

13.00 – 14.00: Lunch break

14.00 – 16.00: Working Group Session I

Working Group “Challenges” (Maelbeek Room)

Chair: James E. Katz (Boston University, US)

14.00 – 14.20: **James Katz** (Boston University, US) “Attitudes toward robots suitability for various jobs as affected robot appearance”

14.20 – 14.40: **Matthias Rehm** (Aalborg University, DK) “Culture Aware Robotics”

14.40 – 15.00: **Shuzhi Sam Ge** (National University of Singapore, SG) “Era of Social Robots”

15.00 – 15.20: **Christine Linke** (University of Berlin, DE) “Phenomena of Human-Social Robot-Interaction: The Social Construction of Reciprocity, (Inter-)Subjectivity and Relationship”

15.20 – 16.00: Panel Discussion

Working Group “Perception” (Passage Room)

Chair: Ryad Chellali (Italian Institute of Technology, IT)

14.00 – 14.20: **Maria Bakardjieva** (University of Calgary, CA) “This Bot Hurt my Feelings: Ethics and Politics for Social Bots”
14.20 – 14.40: **Nikhil Bhattacharya** (Institute for Liberal Arts, US) “With Our Technology, In Our Image: A Philosophical Analysis of Social Robots”
14.40 – 15.00: **Charles Ess** (University of Oslo, NO) “Robots and Humans as Virtuous Agents? Core questions and challenges”
15.00 – 15.20: **Michaela Pfadenhauer** (Karlsruhe Institute of Technology, DE) “The Contemporary Appeal of Artificial Companions”
15.20 – 16.00: Panel Discussion

Working Group “Applications” (Polak Room)

Chair: Alessandro Saffiotti (Orebro University, SE)

14.00 – 14.20: **Rytis Maskeliunas** (Kaunas University of Technology, LT) “Gaze tracking based emotional status determination”
14.20 – 14.40: **Timo Kaerlein** (Universität Paderborn, DE) “The robotic moment in mobile media. An inquiry into new intimacies in human-technology relationships”
14.40 – 15.00: **Pelachaud Catherine** (CNRS, FR) “Socio-emotional humanoid agent”
15.00 – 15.20: **Barbara Lewandowska Tomaszczyk and Paul A. Wilson** (University of Lodz, PL) “Affective robotics - modelling and testing cultural prototypes “
15.20 – 16.00: Panel Discussion

16.00 – 16.30: Coffee break

16.30 – 18.30: Working Group Session II

Working Group “Challenges” (Maelbeek Room)

Chair: James E. Katz (Boston University, US)

16.30 – 16.50: **Amparo Lásen** (University Complutense of Madrid, ES) “The Shared Agency between People and Technologies in the Context of the ‘Affective Paradox’ ”
16.50 – 17.10: **Maria Teresa Riviello** (Second University of Naples and IIASS, IT) “A Cross-Cultural Study on the Effectiveness of Visual and Vocal Channels in Transmitting Dynamic Emotional Information”
17.10 – 17.30: **Juha Röning** (University of Oulu, FI) “Natural Human Robot Interaction”
17.30 – 17.50: **Stefan Benus** (Constantine The Philosopher University, SK) “Social aspects of entrainment in spoken interactions”
17.50 – 18.30: Panel Discussion

Working Group “Perception” (Passage Room)

Chair: Ryad Chellali (Italian Institute of Technology, IT)

16.30 – 16.50: **Sara Rosenblum** (University of Haifa, IL) “Brain-hand language secrets as reflected through a computerized system”
16.50 – 17.10: **Kimmo Vanni** (Tampere University of Applied Sciences, FI) “Social robotics as a tool for promoting occupational health”
17.10 – 17.30: **Shirley Elprama and An Jacobs** (Vrije Universiteit Brussel, BE) “Robots in the operating room”
17.30 – 17.50: **Elizabeth Broadbent** (The University of Auckland, NZ) “The social and emotional impact of robots in healthcare”
17.50 – 18.30: Panel Discussion

Working Group “Applications” (Polak Room)

Chair: Alessandro Saffiotti (Orebro University, SE)

16.30 – 16.50: **Patrick Law** (The Hong Kong Polytechnic University, HK) “Biomedical Engineering: The case of rehabilitation program in Hong Kong”

16.50 – 17.10: **Rui Loureiro** (Middlesex University, UK) “Social robots in the rehabilitation of cognitive and motor function”
17.10 – 17.30: **Anthony Remazeilles** (Tecnalia Research and Innovation, ES) “Development of mobile robots for providing assistance to the elderly population: experience acquired”
17.30 – 17.50: **Filippo Cavallo** (Scuola Superiore Sant'Anna, IT) “Social Robotics for healthcare applications: the Robot-Era experience”
17.50 – 18.10: **Renaud Ronsse** (Université Catholique de Louvain, BE) “Primitive-based entrainment in upper- and lower-limb periodic movement assistance by using adaptive oscillators”
18.10 – 18.30: Panel Discussion

Wednesday 12 June 2013

International Press Centre, Rue de la Loi 155, 1000 Brussels (BE)

8.30 – 9.00: Workshop Registration

9.00 – 11.00: Plenary Session (Polak Room) - Chair: Anna Esposito (Second University of Naples and IIASS, IT)

9.00 – 9.30: **Satomi Sugiyama** (Franklin College Switzerland, CH) **and Jane Vincent** (University of Surrey, UK) “Consideration of the mobile device as a form of social robot”
9.30 – 10.00: **Kerstin Dautenhahn** (University of Hertfordshire, UK) “Social robotics and real world applications – an interdisciplinary perspective”
10.00 – 10.30: **Anniina Huttunen** (University of Helsinki, FI) “Does Intelligence Matter? - Legal Ramifications of Intelligent Systems”
10.30 – 11.00: **David Cohen and Mohamed Chetouani** (University Pierre and Marie Curie, FR) “Social Signal Processing in Developmental Psycho-Pathology”

11.00 – 11.30: Coffee break

11.30 – 13.30: Working Group Session III

Working Group “Challenges” (Maelbeek Room)

Chair: Harmeet Sawhney (Indiana University, US)

11.30 – 11.50: **Carlo Nati** (Education 2.0, IT) “Cad software to introduce robotic design process at school”
11.50 – 12.10: **Chung Tai Cheng** (The Hong Kong Polytechnic University, HK) “The technologicalization of education in China and the case study of Home-School Communication System”
12.10 – 12.30: **Michele Viel and Giovanni Ferrin** (University of Udine, IT) “Taming social robots through playfulness and do it yourself: children in action”
12.30 – 12.50: **Linda Giannini** (MIUR, IT) “Pinocchio 2.0, robot and other stories”
12.50 – 13.30: Panel Discussion

Working Group “Perception” (Passage Room)

Chair: Guglielmo Tamburrini (University of Naples “Federico II”, IT)

11.30 – 11.50: **Nadia Berthouze** (University College London, UK) “Body Movement and touch behaviour as means to recognize and enhance affective experience”
11.50 – 12.10: **Marcin Skowron** (Austrian Research Institute for Artificial Intelligence, AT) “From Virtual to Robot Bartender: insights from the affective dialogue system”
12.10 – 12.30: **Anna Esposito** (Second University of Naples and IIASS, IT) “Emotional expressions: Communicative displays or psychological universals?”

12.30 – 12.50: **Kristrún Gunnarsdóttir** (Lancaster University, UK) “Robot assistance: prominent visions and problem domains”
12.50 – 13.30: Panel Discussion

Working Group “Applications” (Polak Room)

Chair: Sara Rosenblum (University of Haifa, IL)

11.30 – 11.50: **Hicham Atassi** (Brno University of Technology, CZ) “An Autonomous intelligent system for Call Centres Surveillance and Assessment”
11.50 – 12.10: **Tatsuya Matsui** (Flower Robotics Inc., JP) “A design approach for the robots to be accepted in the society”
12.10 – 12.30: **Claudia Pagliari** (University of Edinburgh, UK) “Roles, relationships and rights in interactions between real and virtual humans: insights and implications from a study on Avatar-supported eHealth”
12.30 – 12.50: **Vanessa Evers** (University of Twente, NL) “Human Robot Co-existence”
12.50 – 13.30: Panel Discussion

13.30 – 14.30: Lunch break

14.30 – 16.30: Working Group Session IV

Working Group “Challenges” (Maelbeek Room)

Chair: Harmeet Sawhney (Indiana University, US)

14.30 – 14.50: **Ryad Chellali** (Italian Institute of Technology, IT) “The Social Robot: myths, reality and perspectives”
14.50 – 15.10: **Raul Pertierra** (Manila University, PH) " The person in the machine: the machine in the person”
15.10 – 15.30: **Joachim Hoeflich and Afifa El Bayed** (University of Erfurt, DE) “The Acceptance of Social Robots in Today’s Germany and its Prospects”
15.30 – 15.50: **Nello Barile** (Iulm, University of Milan, IT) “The automation of taste: anthropological effects of Shazam and another apps used as search engines in the everyday life”
15.50 – 16.30: Panel Discussion

Working Group “Perception” (Passage Room)

Chair: Guglielmo Tamburrini (University of Naples “Federico II”, IT)

14.30 – 14.50: **Davide Fornari** (Supsi University of Applied Sciences and Arts of Southern Switzerland, CH) “Face as interface: anthropomorphic and zoomorphic artefacts”
14.50 – 15.10: **Takaaki Kuratate** (Technical University of Munich, DE) “Mask-bot: a retro-projected talking head for social interaction media applications”
15.10 – 15.30: **Carl Vogel** (Trinity College Dublin, IE) “Intending no offence”
15.30 – 15.50: **Etienne Burdet** (Imperial College London, UK) “Adaptive nature of human-human interaction”
15.50 – 16.10: **Peter Sinčák** (Technical University of Kosice, SK)
16.10 – 16.30: Panel Discussion

Working Group “Applications” (Polak Room)

Chair: Sara Rosenblum (Haifa University, IL)

14.30 – 14.50: **Milan Gnjatović** (University of Novi Sad, SR) “The Child, the Therapist, and the Robot: Adaptive Dialogue Management in Three-Party Interaction”
14.50 – 15.10: **Sonya Meyer** (Haifa University, IL) “Social Robots as possible Celiac Disease management mediators for supporting adherence to a healthy lifestyle”
15.10 – 15.30: **Hideki Kozima** (Miyagi University, JP) “Social robot for autism therapy”

15.30 – 15.50: **Frano Petric** (University of Zagreb, HR) “Application of Humanoid Robots in Diagnostics of Autism”

15.50 – 16.30: Panel Discussion

16.30 – 18.00: Social Robots Exhibition (opened by private reception)

Thursday 13 June 2013

International Press Centre, Rue de la Loi 155, 1000 Brussels (BE)

8.30 – 9.00: Workshop Registration

9.00 – 10.30: Plenary Session (Polak Room) - Chair: Thierry Keller (Tecnalia Research & Innovation, ES)

9.00 – 9.30: **Paolo Dario** (Scuola Superiore Sant’Anna, IT) “Robot Companions for Citizens: a Vision to Address Societal Challenges and to Improve Quality of Life”

9.30 – 10.00: **Aude Billard** (École Polytechnique Fédérale de Lausanne, CH) “Issues when transferring knowledge from humans to robots”

10.00 – 10.30: **Alessandro Vinciarelli** (University of Glasgow, UK) “Social Signal Processing”

10.30 – 11.00: Coffee break

11.00 – 13.00: Working Group Session V

Working Group “Challenges” (Maelbeek Room)

Chair: Maria Bakardjieva (University of Calgary, CA)

11.00 – 11.20: **Alessandro Saffiotti** (Orebro University , SE) “Towards a human robots-environment ecosystem: opportunities and challenges”

11.20 – 11.40: **António Brandão Moniz** (Karlsruhe Institute of Technology, DE) “Intuitive interaction between humans and robots in industrial environments: the social robotics role”

11.40 – 12.00: **Maria Koutsombogera** (Institute for Language And Speech Processing, EL) “Developing resources of social interactions”

12.00 – 12.20: **Costanza Navarretta** (University of Copenhagen, DK) “The annotation and use of multimodal corpora for modelling believable social robots”

12.20 – 13.00: Panel Discussion

Working Group “Perception” (Passage Room)

Chair: Valèria Csèpe (Hungarian Academy of Sciences, HU)

11.00 – 11.20 **Valéria Csépe** (Hungarian Academy of Sciences) “Augmented reality and assisted perception”

11.20 – 11.40 **Angelo Cangelosi** (Plymouth University, UK) “Embodied Language Learning in Human-Robot Interaction”

11.40 – 12.00 **Agnieszka Wykowska** (Ludwig Maximilians Universität, DE) "Cognitive- and social neuroscience for social robotics - how the present challenges can tell us where to go in the future”

12.00 – 12.20 **Karola Pitsch** (Bielefeld University, DE) “Social Learning from an Interactional Perspective. The role of a robot's feedback in tutoring situations in human-robot-interaction”

12.20 – 13.00: Panel Discussion

Working Group “Applications” (Polak Room)

Chair: Alicia Casals (Universitat Politècnica de Catalunya, ES)

11.00 – 11.20: **Thierry Keller** (Tecnalia Research & Innovation, ES) “Robotics for Neurorehabilitation: Current challenges and approaches”

11.20 – 11.40: **Alicia Casals** (Universitat Politècnica de Catalunya, ES) “Social Acceptance in robotics for health”

11.40 – 12.00: **Peter Friedland** (Peter Friedland Consulting, US) “Developing Trust in Human-Machine Interaction”

12.00 – 12.20: **Marcos Faundez Zanuy** (Escola Universitaria Politecnica de Mataro, ES) “Xnergic: a Tecnocampus initiative to promote engineering vocations”

12.20 – 13.00: Panel Discussion

13.00 – 14.00: Lunch break

14.00 – 15.30: Summaries by Working Groups’ Chairs - Chair: James Katz (Boston University, US)

15.30 – 16.00: Conclusions and Follow-Up - Chair: Leopoldina Fortunati (University of Udine, IT)

Speakers

Gian Piero Brunetta

Organisation University of Padua

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Biography Gian Piero Brunetta, born in Cesena in 1942. Professor of the History of Cinema at the University of Padua, Italy, visiting professor in many universities of the United States (Iowa, Princeton, Chicago, New York), in Paris and Alicante and Barcelona. He has written and edited many books and articles on Italian cinema and on history of spectatorshiph. His publications include Storia del cinema italiano, V volumes, Buio in sala,1988, Cent'anni di cinema italiano, 1991, Il viaggio dell'icononauta, 1998, Guida al cinema italiano, 2003 (translated in USA, Japon and in South America), He is editor of five-volumes History of world cinema. He collaborated with Ettore Scola in Splendor (1988) and he wrote the subject for the TV program of Ganfranco Mingozzi, Storie di cinema edi emigranti (1986). He directed Mystfest Festival in Cattolica and was the inventor and curator of the exhibition for the Centennial of Italian Cinema in Cinecittà (1995).

Abstract **Robots in the cinema**

Robots acquired an important role in the filmic imagination very early. In relationship to many others symbols of modernity - car, train, airplane - robot passes through the entire history of the cinema and he is able to connect past and future and to project his shadow and his evolving image in a post-apocalyptic dimension.

At times he's a demonstrations of satanic power, others he's a redeeming being, or he seems as an angelic creature, a magic helper, a protector in many adventures in the present and future for discovery of new frontiers. Sometimes he is our shadow, or our double, he's transfert of worries in the imagination of the future, now is a final ring in a evolutionary chain of the mankind. In the future of the mankind, as if we assist to a process of philogeny in the last decades, we have the impression that science aims to attain a perfect assimilation between the human being and something artificially created.

Robots, droids, cyborgs, replicants, androids, step by step became familiars and plays an important role in the popular imagination. Today in a new and more recent galactic landscape and in a new melting pot of interplanetariens species it is possible to meet robots and androids everywhere and not to be able to distinguish man and replicants. In the last twenty years cinema seemed obliged to reconsider the relationship between man and machine and to accept the the coming of a post human age when machines will acquire a human like intelligence enriched by emotions and consciusness. This is the way indicated from Avatar, but also from other recent titles on the artificial intelligence, like I Robot, Alex Proyas, 2004, A.I. Artificial Intelligence by Steven Spielberg (2001), Surrogates (2012) with Bruce Willis

Tatiana Kovacikova

Organisation	COST - European Cooperation in Science and Technology
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Biography

Tatiana’s original background is in telecommunications engineering; she graduated from University of Transport and Communications and got her Phd in the University of Zilina in Slovakia in ‘96 in ICT. In 2005, Tatiana became “Associated Professor” and in 2012 “Full Professor”. Tatiana has more than 10 years’ experience in science management at national as well as European level. As senior researcher she led a number of international research projects. She was project co-ordinator in projects such as: TEMPUS, COPERNICUS, INCO-COPERNICUS, EURESCOM and others FP6/FP7 projects and two COST Actions 242 and 257. She is also regularly invited by the EC DG CONNECT to review R&D projects (proposals and on-going). Tatiana has also more than 10 years of experience in standardisation working for ETSI. Before joining the COST Office as Head of Science Operations, as head of department Tatiana has led a team of 40 University teachers, researchers and PhD students as well as international research teams in the topics of ICT.

Leopoldina Fortunati

Organisation: University of Udine, Human Sciences

COST involvement: COST Actions A20, A30, 298, IS0901, IS0906, FP1104, IS1202, IS1209

E-mail: fortunati.deluca@tin.it

Biography: Leopoldina Fortunati is professor of Sociology of Communication at the Faculty of Education of the University of Udine. She has conducted several research in the field of gender studies, cultural processes and communication and information technologies. She is the author and editor of many books, is associate editor of the journal The Information Society and serves as referee for many outstanding journals. She is active at European level especially in COST networks and is the Italian representative in the COST Domain Committee (ISCH, Individuals, Societies, Cultures and Health). She is the co-chair with Richard Ling of the International Association "The Society for the Social Study of Mobile Communication" (SSSMC). Her works have been published in eleven languages: Bulgarian, Chinese, English, French, German, Italian, Japanese, Korean, Russian, Slovenian, Spanish.

Abstract

Europeans' perceptions of robots and related implications for the policies of the social

Presented by Sakari Taipale, Mauro Sarrica, Federico de Luca and Leopoldina Fortunati.

The studies on social robots need to include three different fields of social studies: first, the so-called user studies, which aim to investigate the use of technological artefacts in the everyday life as well as their socio-economic, symbolic and cultural meanings; second, the so-called science and technology studies (STS) that explore the social representations of science and technology, including controversies; third, the political studies that analyse social needs and desires in light of technological change and economic constraints and try to come up with proposals and solutions. It is complex, contemporary societies that need to manage, on the one hand, scientific expertise on crucial topics, and, on the other, citizens' participation and opinions. This is not an easy task, but necessary to make in the end good decisions for society, taking into consideration the main economic, social, political and cultural aspects that shape the problem considered. Hard science projects on social robots often tend to justify their "raison d'être" sketching some economic and social premises. However, these premises are generally weak and show that there is the need for another type of interdisciplinary approach, which is not only inclusive of the hard sciences but also of a wide range of social sciences. For all these reasons, the present study aims to think over and reconstruct the socio-economic debate about (social) robots that has developed internationally, and to understand towards what directions this debate is proceeding. In fact, social robots represent a new wave of robotic technologies that is less known in the

mainstream social science. Social robots are able to perceive and interpret the social world, engage in social interaction and communication, and they require other types of qualities, such as flexibility, sensitiveness, and a pleasant touch, than non-social industrial robots. Thus, there are hopes that social robot technologies might be more liable to resonate with the realm of social reproduction and immaterial work (e.g. family relations, child and elderly care, domestic chores) than robots developed for industrial and productive purposes. By analysing a special Eurobarometer data, we aim to describe the current position of European citizens towards social robots. Eurobarometer 382 “Public Attitudes towards Robots” survey (N=26,751) was collected from EU citizens aged 15 and over in 27 Member States in 2012. Respondents were interviewed face-to-face at their homes. The methods that we apply in this study include descriptive and multivariate statistics. We will first discuss in which areas of life European citizens are willing and unwilling to encounter robotic applications. Second, the study will show to what extent European countries clusterize around certain areas of application that are viewed more applicable/non-applicable than others. Third, the study will investigate what are the main predictors of individual pro- and anti-robotic attitudes.

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Biography: Anne Bajart has a PhD in Electrical Engineering. She is Research Programme Officer at the European Commission. Before working for the EC, she worked as researcher and project manager at the University of Liège (BE), at the EPFL (CH) and at Philips (BE). She has expertise in systems control, digital signal processing, power electronics and speech recognition. Her main areas of interest today are robots, Human-Robot and Human-Computer Interaction, benchmarking and evaluation of systems, intelligent control of complex systems, dissemination of science and social acceptance of technology.

Abstract

The EU-funded research programme in robotics: achievements and perspectives

The EU has been funding research in cognitive systems and robotics for more than 10 years, with the goal to make robots and cognitive systems more intuitive, robust, autonomous and acting in a real-world environments. This talk will present the main achievements of the programme and give some perspective on the current situation of robotics research in Europe, as well as future opportunities and challenges.

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Biography: Fabrizio Sestini is a scientific officer working with the European Commission since 1997, currently with the unit "Net Innovation" of DG CONNECT. He is team leader for the multidisciplinary initiatives "Collective Awareness Platforms for Sustainability and Social Innovation" and "Internet Science", which aim at achieving a better understanding of the interrelations between technological developments and socio-economic-environmental impacts of the Internet, and at pioneering new innovative pilots of socially-minded Internet platforms exploiting the network effect and the collective intelligence resulting from Internet-based human collaboration. The goal is to identify Internet solutions which, beyond commercial hype, can lead to a more open, inclusive, sustainable and collaborative society.

Previously, he has launched and managed several research initiatives related to different aspects of Future Internet policies and technological developments (including SAC – Situated and Autonomic Communications and FIRE – Future Internet Research and Experimentation). Before that, he spent 6 years with University of Rome "La Sapienza" (where he obtained his PhD in Information and Communication Engineering) and RAI, and published some 30 scientific papers on international journals and conferences. He is an IEEE Senior Member and has served on the boards organising several scientific conferences.

Abstract: **Collective Intelligence, Internet Ethics and Sustainability: Issues for Social Robots**

Sakari Taipale

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Biography Dr. Sakari Taipale received his Ph.D. at the University of Jyväskylä in 2009. His doctoral research was recognized with the 2009 Agora Award for Excellence for the best dissertation in human technology at the university. In 2012, he became Adjunct Professor at the University of Eastern Finland. Dr. Taipale has published several articles in, and served as a referee for, many high-ranking international journals (such British Journal of Sociology, Telecommunications Policy, European Journal of Communication, and Mobilities). He is currently working on a three-year post-doctoral research project funded by the Academy of Finland (2011–2013).

Abstract **European perceptions of robots and related implications for the policies of the social**

When tackling complex future challenges, contemporary societies need to manage scientific knowledge on crucial topics, consider citizens' opinions and include both in decision making. Taking into account the economic, social, political and cultural aspects that shape these challenges is in fact necessary to make good decisions. In hard sciences, the "raison d'être" of the social robots projects are often justified by referring to certain economic benefits and social needs. However, these economic and social premises are not always very solid, which points out the need for another type of interdisciplinary approach, which conjoins hard sciences and a range of social and human sciences.

There are at least three different fields of social studies which can contribute to the study of social robotics. First of them is user studies, whose aim is to investigate the use of technological artefacts in the everyday life as well as their socio-economic, symbolic and cultural meanings. The second one is science and technology studies, which explores the social representations of science and technology as well as controversies related to them. Third, social sciences comprise a set of policy studies that analyse social needs and desires in light of technological change and economic constraints. It is especially these studies that aim to produce some policy recommendations and responses to the complex future challenges they deal with.

Starting from these considerations, the present study aims to think over and reconstruct the socio-economic debate about (social) robots. It also aims to show towards what directions this debate is moving. In social sciences, social robots represent a new wave of robotic technologies that is poorly known and even less studied. Social robots should be able to perceive and interpret the social world as well as to engage in social interaction and communication. They require other types of qualities, such as flexibility, sensitiveness, and a pleasant touch, than non-social

industrial robots that gained some attention in social sciences when automation, the deskilling of workers were discussed in the past. Automation was associated with the substitution of workers by robots, with the consequence that workers are made redundant. Due to the new properties of social robots, that clearly resonate with the realm of social reproduction and immaterial work (e.g. family relations, child and elderly care, household work), it is possible that robot studies get new air under its wings in social sciences.

This study describes the current position of European citizens towards social robots. This is done by analysing Eurobarometer 382 “Public Attitudes towards Robots” survey (N=26,751) that was collected from EU citizens aged 15 and over in 27 member states in 2012. Respondents were interviewed face-to-face at their homes. The data is analysed by using descriptive and multivariate statistics. The study will first discuss in which areas of life European citizens are willing and unwilling to encounter robotic applications. Second, the study will show to what extent European countries clusterize around certain areas of application that are viewed more applicable/non-applicable than others. Third, the study will investigate what are the main predictors of individual pro- and anti-robotic attitudes.

In the Eurobarometer, especially two questions were used to investigate citizens’ perceptions: “In which areas do you think that robots should be used as a priority?” and “In which areas do you think that the use of robots should be banned?” A maximum of three answers per question was allowed and the following answer categories were supplied: manufacturing, healthcare, leisure, domestic use (such as cleaning), military and security, search and rescue, education, care of children, elderly and the disabled, space exploration, agriculture, transport/logistics, other, none, DK.

Preliminary results of this study show that Europeans’ attitude towards robots in general is much more positive than negative. In fact, only 2% of Europeans state that robots should not be introduced in any sector, while 10% argue that they should not be banned from any sector. Moreover, 71% of Europeans gave three positive answers to the question “In which areas do you think that robots should be used as a priority?”, whilst only 37% provided all three answers to the question of banning robots.

As to the different areas of robot applications, 57% of the respondents express that robots should be used in manufacturing and 55% in space exploration. 44% of Europeans are convinced that robots should be used in search and rescue operations and 39% are ready to see them in the military sector. These figures indicate that Europeans are not perhaps very concerned that robots would take people’s jobs, like sociologists tended to think in the past. Instead, it might be that people want to see robots saving us from doing the most risky and dangerous tasks.

63% of Europeans consider that robots should be banned, first and foremost, in the care of children, elderly and disabled people. Also education (34%), healthcare (33%) and leisure (21%) are sectors that are considered less suitable for robots. Interestingly, many of these sectors are such where social robots in particular would have a pronounced role to play. To outline the portrait of the respondents, who perceive the use of robots unwelcomed in these social areas of life, regression analyses were executed.

Preliminary results of these regression analyses are illustrative of socio-

economic and country differences. First, regarding the use of robots in the care sector, women are more against than men. Compared with employees, pensioner and students are more ready to have robots in care work. Similarly, urban dwellers are more willing to accept robots in the care sector than those living in rural surroundings. Of all countries, especially some Nordic countries (Finland, Estonia), small West European countries (Belgium and the Netherlands, whose welfare system have resemblance to the Nordic countries) and some East European countries (Bulgaria, Romania, Hungary, Czech Republic) are most ready for seeing robots in care work. Second, as regards the education sector, men are more supportive of the use of robots than women. Compared with workers, pensioners are most prepared to see robots in education perhaps because they would remain unaffected. The positive evaluations concerning the robotic applications in the education sector are also connected with respondents' educational attainments. Regarding country differences, respondents from Nordic countries (Finland, Sweden, Denmark), Ireland and the United Kingdom hold the most positives perception of robots in the field of education. Third, Europeans' perceptions of robots in connection to healthcare are quite similar to those related to care and education; men are more positive than women, pensioners more positive than employees, and urban dwellers more supportive of robots than people living in rural locations. Respondent's education history is connected to positive evaluations, too. What is different here is that people living in the families of one parent and children are more inclined to see robots in healthcare than couples with children. Finally Baltic countries (Estonia, Latvia and Lithuania) are most liable to ban the use of robots in the healthcare sector in European context.

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Biography Atsuo Takanishi is Professor of the Department of Modern Mechanical Engineering, Waseda University and the Director of the Humanoid Robotics Institute, Waseda University. He received the B.S.E. degree in 1980, the M.S.E. degree in 1982 and the Ph.D. degree in 1988, all in Mechanical Engineering from Waseda University. His current researches relate to Humanoid Robots and its applications in medicine and well-being such as the biped walking robots, the emotion expression robots, the wind instrument player robots, the medical inspection robots, the medical training simulator robots, etc. He is a member of IFToMM and IEEE, Robotics Society of Japan (RSJ, the vice president from 2013), Japanese Society of Mechanical Engineers, and other medicine/dentistry related societies in Japan. He received many scientific and activity awards such as the RSJ Best Journal Paper Award (1998), BusinessWeek Best of Asia Award (2001), IROS2003 Best Paper Award –Application, RSJ Fellow Award (2012), etc.

Abstract **Some aspects of humanoid robot design**

Even though the market size is still small at this moment, applied fields of robots are gradually spreading from the manufacturing industry to the others in recent years. One can now easily expect that applications of robots will expand into the first and the third industrial fields as one of the important components to support our society in the 21st century. There also raises strong anticipations in Japan that robots for the personal use will coexist with humans and provide supports such as the assistance for the housework, care of the aged and the physically handicapped, since Japan is the fastest aging society in the world. Consequently, humanoid robots and/or animaloid robots have been treated as subjects of robotics researches in Japan such as research tools for human/animal science, entertainment/mental-commit robots, assistant/agent robots for humans in the human living environment or patient simulation robots for medical training. Over the last decades, several manufactures started to develop prototypes or even to sell mass production robots for the purposes mentioned above, such as the SONY's pet robot AIBO and the small size humanoid robot QRIO, the TMSUK's tele-humanoid robot TMSUK04 and KIYOMORI, the HONDA's walking humanoid robot ASIMO, the TOYOTA's partner humanoid robots, the NEC's information agent robot PaPeRo, etc. Most of those robots have some lifelikeness in their appearances and behaviors. Moreover, AIST, METI of Japan launched some national projects, such as Humanoid Research Project (HRP) in 1998 and the New Generation Robot Project in 2004 to develop humanoid robots and service robots, to accelerate the market growth of personal and service robots in the near future. On the other hand, Waseda University, where we belong to, has been one of the leading

research sites on humanoid robot research since the late Prof. Ichiro Kato and his colleagues started the WABOT (WAseda roBOT) Project and produced the historically first humanoid robots WABOT-1 that could bipedal-walk in 1973 and the musician robot WABOT-2 that could play the electric organ in 1984. One of the most important aspects of our research philosophy is as follows: By constructing anthropomorphic/humanoid robots that function and behave like a human, we are attempting to develop a design method of a humanoid robot having human friendliness to coexist with humans naturally and symbiotically, as well as to scientifically build not only the physical model of a human but also the mental model of it from the engineering view point. Based upon the research philosophy mentioned above, we have been doing researches on humanoid robots, such as the Bipedal Walking Humanoid Robots WABIAN(WAseda BIpedal humANoid) series, Mastication Robots as WJ(Waseda Jaw) series, Flute and Saxophone Player Robots as WF(Waseda Flutist) and WAS(WAseda Saxophonist) series, Emotion Expression Humanoid Robots WE(Waseda Eye) series and KOBIAN ,Speech Production Robots as WT(Waseda Talker) series, Airway Management Training Simulator Humanoid Robots, etc. In my talk at the COST workshop 2013, I will introduce some aspects of designing our latest humanoid robots with reference to humanoid robots being developed in other companies/organizations such as the robots mentioned above, Geminoid developed in Osaka University, etc.

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Biography: Antonio Bicchi is Professor of Robotics and Control Systems at the University of Pisa, and Senior Scientist at the Italian Institute of Technology in Genoa. He graduated from the University of Bologna in 1988 and was a postdoc scholar at M.I.T. Artificial Intelligence lab in 1988–1990. Antonio Bicchi is the recipient of several awards and honors, including an individual Advanced Grant from the European Research Council for his research on human and robot hands in 2012. He has published more than 300 papers on international journals, books, and refereed conferences. He has served as the Director of the Interdepartmental Research Center “E. Piaggio” of the University of Pisa in the period 2003-2012. He currently serves as the President of the Italian Association or Researchers in Automatic Control.

Abstract

From social robots to societies of robots

In this talk I will review some of the work that has been done in Europe and elsewhere to address the need for a change in paradigm of modern robotics, from the heavy and rigid mechanisms that were used on factory floors, to the soft robots that will enable safe and effective human-robot interaction. I will also speculate on the consequences of a wider diffusion of personal and asssistive robotics in the society, and the new problems that the robot-robot intercation are going to generate, and how we could solve them.

Naomi S. Baron

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Biography Naomi S. Baron is Professor of Linguistics and Executive Director of the Center for Teaching, Research, and Learning at American University in Washington, DC. Her research focuses on the interrelationships between speech, writing, and technology. Among her books are Alphabet to Email: How Written English Evolved and Where It's Heading (Routledge, 2000) and Always On: Language in an Online and Mobile World (Oxford, 2008), which won the English-Speaking Union's Duke of Edinburgh English Language Book Award for 2008. Baron recently completed a three-year cross-cultural project analyzing mobile phone use (and attitudes towards mobiles) by university students in Sweden, the US, Italy, Japan, and Korea. Presently, Baron is analyzing reading onscreen versus in hard copy. For AY 2012-2013, she has been a Visiting Scholar at the Stanford Center for Advanced Study in the Behavioral Sciences, where she is working on her new book, Words Onscreen: The Fate of Reading in an Online World (Oxford).

Abstract **Shall We Talk? Conversing with Humans and Robots**

What do you say to a robot? Obviously, the answer is limited by the robot's capacity to process human language. But it also depends upon what you want to talk about and what kind of response you're looking for. Language has long been assumed to be an ability unique to humans. Yet even those rejecting a sharp Cartesian divide between human and non-human communication don't look for chimps or gorillas to compose sonnets or run customer complaint desks. What about robots? While the computer programs behind them may not match Shakespeare, they are already writing fiction. As for customer service, a growing number of voice recognition programs are doing reasonably well. When we think about language, we need to keep in mind two defining parameters. The first is medium: Are we talking about spoken or written language? The second parameter is whether the language is monologue or dialogue. Chomsky's linguistic model, based on the ideal speaker-hearer, essentially looked only at monologue. However, the analysis of discourse between (or among) individuals has received significant attention from sociologists and anthropologists, and from linguists who focus on social interaction. In the domain of dialogue, the philosopher of language H. Paul Grice articulated a set of maxims intended to define the basic rules of interpersonal conversation. These include such conventions as telling the truth, and being clear and concise. But people often don't follow these maxims in real life. We withhold information from one another. We make assertions based on no evidence. We often change the topic. And sometimes we are longwinded, as well as intentionally obscure. Such violations of Grice's maxims (and their correlates) should hardly be surprising, since part of what it means to be

human (and to use a human language) is knowing how to manipulate not only the truth, but our interlocutor. Another part of being a human language user is knowing how to adapt our conversation to match our assumptions about the linguistic abilities of the interlocutor. Linguists describe a speech register they call “foreigner talk”, used for addressing people who don’t have proficient command of the language we are speaking. Foreigner talk has much in common with “baby talk” – the language style adult speakers in most of world use in addressing young children. All of these adaptations tend to involve such features as higher than normal pitch levels, simplification of vocabulary and syntax, slower than normal speed, and frequent repetition of what is said. While such accommodations may help facilitate more successful communication between the two parties, the strongest motivation is often empathy with another living being. Should robots (unlike their human designers) be programmed to faithfully follow “the rules” of conversation? Should we be adapting the language we use in addressing them, as we do in baby talk or foreigner talk? Do we expect robots to shape their language in comparable ways in addressing us? To answer the question of what we want to say to robots – and what conversation we desire back in return – we begin by taking stock of how humans use digital devices to communicate with each other and then how robots mimic (or fail to mimic) human conversation. We then address the questions of what humans want from our conversations with robots, concluding that it is not necessarily what we want from conversations with each other.

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Biography: Anna Esposito is currently Associate Professor in Computer Science at the Department of Psychology, Second University of Naples and Senior Researcher at the IIASS, in Vietri sul Mare, Salerno, IT. She has been research professor in the Department of Computer Science and Engineering at Wright State University, to which she is currently research affiliate. Anna current research interests are on the perceptual features of verbal and nonverbal communicative signals, in particular on cross-modal analysis of speech, gesture, and expressions of emotions. Further research interests are on language disorders, timing in language, signal processing and models and applications of neural networks. She is author of more than 130 publications on international journals, books, and international conference proceedings, and editor of 18 international books.

Abstract

Emotional expressions: Communicative displays or psychological universals?

Emotional feelings permeate our everyday experience, consciously or unconsciously driving our daily activities and constraining our perception, actions and reactions. In the daily body-to-body interaction, our ability to decode emotional expressions plays a vital role in creating social linkages, producing cultural exchanges, influencing relationships and communicating meanings. In this context, emotional information is simultaneously transmitted through verbal (the semantic content of a message) and nonverbal (facial expressions, vocal expressions, gestures, paralinguistic information) communicative tools and relations and exchanges are highly affected by the way this information is coded/decoded by/from the addresser/addressee as well as by the contextual instance and the environmental conditions. Research devoted to the understanding of the perceptual and cognitive processes involved in the decoding of emotional states during interactional exchanges is particularly relevant both for build up and harden human relationships and for developing friendly and emotionally coloured assistive technologies. The accuracy above the chance to decode emotional expressions from faces, speech and gestures suggested the idea of universal psychological. However this idea has been debated by several authors according to whom our expressions are social messages dependent upon context and personal motives and highly affected by the character and direction the ongoing social interaction is taking. Therefore expressions of emotions are learned to efficiently and effectively express intentions and negotiate relations and thus they vary across cultures. This hypothesis was further supported by the fact that sophisticated measurements, such as facial EMGs (Electromyography) to asses facial muscle changes when emotional information was not visually perceptible

proved that distinction among primary emotions and more generally, among negative and positive emotions was not possible. Recent theoretical models have attempted to account for both universality and cultural variations by specifying which particular emotional aspects show similarities and differences across cultural boundaries. A prevalent view states that emotional expressions are triggered by emotionally underlying events even though expressions are, to some degree, shaped by contextual factors and cultural and personal display rules, such as social rules and individual emotion regulation strategies. This view was challenged by data showing a very loosely coupling of facial expressions to emotion specific-event or appraisals. These open questions are discussed at the light of experimental data obtained from subjects speaking different languages. Research devoted to the understanding of the perceptual and cognitive processes involved in the decoding of emotional states during interactional exchanges is particularly relevant in the field of Human-Human, Human-Computer Interaction and Robotics both for build up and harden human relationships and for developing friendly, emotionally and socially believable assistive technologies.

Satomi Sugiyama

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Biography Satomi Sugiyama is associate professor of Communication and Media Studies at Franklin College Switzerland. She has been conducting research on the way young people perceive and use mobile communication technologies in various cultural contexts, particularly in Japan. She completed her Ph.D. in Communication at Rutgers University in 2006. She was awarded MacArthur and National Endowment for the Humanities pre-doctoral fellowships at Colgate University. She has organized an international exploratory workshop on social robots and emotion upon receiving a grant from the Swiss National Science Foundation in 2011, and is currently examining the boundary between humans and mobile technologies.

Jane Vincent

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Biography Dr Jane Vincent is Senior Research Fellow at the LSE Media and Communications Department and Visiting Fellow with the Digital World Research Centre at the University of Surrey. She researches the social practices of mobile communications and ICT users. Her studies for industry and international academic organizations on the social shaping of technology, children's and older peoples' use of mobile phones are published widely and Jane's work on emotions and mobile phones is published in English, German and Russian.

Abstract **Consideration of the mobile device as a form of social robots**

Various forms of robots are gaining increasingly more attention of the public in recent years. From the industrial sphere to the domestic sphere, robots are being integrated into our society. Looking at the phenomenon from a perspective of communication studies, the types of robot that triggers certain sense of sociality prompt a variety of questions. For example, how do we as humans make sense of the robots we interact in everyday life? What do they consider as robots? What are their emotional experiences interacting with robots? The term social robots triggers the image of humanoid or animaloid robots, such as

Tamagotchis, Furbies, Aibos, Paro, and ASIMO, which have been introduced as relational artefacts. Some of these have already been commercialized, and have been examined in terms of the intimacy and emotion that humans develop toward such relational artefacts (e.g., Turkle, 2007, 2011; Halpern & Katz, 2013), and how such emotional connections, albeit not mutually experienced between the interactants, can lead to the well-being of humans (e.g., Hutson et al.). This type of social interactions raises a critical question of how humans experience emotions in the contemporary social life. One approach that we can take to examine this question is through the concept of electronic emotions, which are "emotions lived, re-lived or discovered through machines" (Fortunati & Vincent, 2009, p. 13), and such emotions have "rarefied the emotional sphere, making it more difficult to detect" (p. 15). This form of emotional experience is situated within the context of the increasingly smarter information and communication technologies (ICTs), or even, the ICTs that are going through the process of anthropomorphisation (Fortunati & Vincent). The idea of anthropomorphisized ICTs has been examined by some of the mobile communication scholars, pointing out the hybridization of the human body and machines (e.g., Fortunati, 2003; Katz, 2003; Fortunati, Katz, Riccini, 2003). These works do not only posit the anthropomorphisized machines but also imply the technologized human. Based on the premise that mobile ICTs have been pervading the human body, and the human body is coming so close to the mobile machine, a workshop was organized in 2011, Lugano, Switzerland, so as to explore the boundary between humans and ICTs. One of the essential questions considered at the workshop was whether ICTs are turning into social robots, and also, whether humans are turning into social robots, as a result of the shrinking distance between ICTs and the body. Through examining the emotional experiences people report in using the mobile device, Vincent (2013) argues that the mobile is a personalized social robot, and Sugiyama (2013) argues that the mobile is a quasi-social robot. The present paper builds upon the past research and seeks to explore a form of social robots, that is, a mobile device, to see how this broader understanding of social robot can shed some new lights in considering everyday communication of humans living with robots. The discussion will further contribute to the exploration of "ubiquitous social roboting" (Fortunati, 2013).

Kerstin Dautenhahn

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Biography Kerstin Dautenhahn is Professor of Artificial Intelligence in the School of Computer Science at University of Hertfordshire in U.K. Her key areas of research include social robotics, human-robot interaction, assistive technology and she has published more than 300 research articles. Prof. Dautenhahn has edited several books and frequently gives invited keynote lectures at international meetings. She organizes international conferences and has been Principal Investigator of her research team in several European projects. Dr. Dautenhahn is Editor in Chief of the Journal of Interaction Studies: Social Behaviour and Communication in Biological and Artificial Systems, as well as Associate Editor of several other international journals.

Abstract

Social robotics and real world applications – An interdisciplinary perspective

Social robotics is a very interdisciplinary area that takes inspiration from social behavior, communication and interaction in biological systems and uses some of these concepts in order to create artifacts that behave socially. Social robots play an important part in the research field of Human-Robot Interaction (HRI). In many application areas robots need to possess social skills in order to fulfill their tasks and to be acceptable. Robot companions have been developed in many areas that require long-term interactions between robots and people. Two areas of research on robot companions will be addressed in my presentation: Robot-assisted therapy (RAT) for children with autism, and robot companions for home assistance e.g. for elderly people. Our research group has been studying how children with autism respond to different types of robots since 1998 as part of the Aurora project. Our primary goal is to use robots in the hands of teachers, therapists or parents as a therapeutic or educational tool. Results show that children with autism are very attracted to robots which can provide a safe, predictable, non-judgmental and enjoyable environment in order to practise and learn about social interaction and communication. A set of scenarios has been developed that can be used in RAT for children with special needs depending on specific developmental and educational objectives. A robot that children with autism respond to very well is the minimally expressive robot KASPAR that has been designed specifically for social interaction. KASPAR has human-like, but very simplified features (compared to a human being). A key role of robots in the Aurora and KASPAR robot is the use of the robots as social mediators, mediating interaction between children with autism and other children or adults. KASPAR has been used as a fully autonomous robot, either for RAT or developmental and cognitive robotics projects, or as a remote-controlled robot. Recently KASPAR has also been shown to be a useful tool in

robot-mediated interviews with young children. A second area where social robot companions can provide useful assistance is the domain of eldercare: robots, in particular as part of a smart home environment, may provide physical, cognitive and social assistance. As part of the previous EU projects Cogniron and LIREC, and the ongoing ACCOMPANY project, we have been studying interactions of people in a naturalistic environment, the University of Hertfordshire Robot House. Here, we have been studying the care-o-bot 3 robot (Fraunhofer), as well as the Sunflower robot developed in our group. Investigating different robot designs/appearances and corresponding robot behaviours highlights significant individual differences in how people respond to robots. The need to personalize robots towards different user groups and individual users is therefore a challenging area of research, in addition to allowing such robots to learn and adapt to dynamic social and non-social situations. Social behavior between robots and machines also plays an important role in rehabilitation robotics, cf. the ongoing SCRIPT project that investigates technologies for rehabilitation of stroke patients for use at home. All the projects have in common a user-centred, rather than technology-centred perspective. Developing systems for long-term, repeated interactions with people need to acknowledge the social nature of people. Neglect of such ‘human’ and ‘social’ factors will most likely lead to systems that may be technologically advanced but that will not be used and not being accepted in our lives. Studies in these application domains may also help us understanding how people communicate and interact socially – with each other and with socially engaging artifacts – and what new types of interactions may emerge.

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Biography Anniina is a doctoral candidate at the Institute of International Economic Law (KATTI), University of Helsinki, where her LL.D. thesis deals with legal aspects of robotics. Her focus is on completing her doctoral thesis in the Graduate School Law in a Changing World (LCW). She also teaches courses on legal issues related to media, intellectual property rights and ICT. She is a member of the board of the Finnish IT Law Association. She analyses how copyright and tort law respond to emerging technologies, with the technology of the day - robotics - as her case study. She is investigating the plausibility of robots as intervening actors in multiple contexts, namely in the area of copyright and tort law. She is conducting a comparative, doctrinal analysis with the intent of assessing the law's flexibility in dealing with emerging technology and examining the role of agency in law. See her research at: https://tuhat.halvi.helsinki.fi/portal/en/person/annhuttu

Abstract

Does intelligence matter? - Legal ramifications of intelligent systems

"Michigan Held off Iowa for a 7-5 win on Saturday. The Hawkeyes (16-21) were Unable to overcome a four-run sixth Inning Deficit. The Hawkeyes clawed back in the Eighth Inning, putting up one run." This piece of sports news was generated by an intelligent system. It was written by Narrative Science’s computers in the United States. It was not created, nor edited by a human, which means that it is completely computer generated. This particular text is likely not protected by copyright, as it is not sufficiently original and creative. However, when the software evolves and becomes able to create writings that fulfill the prerequisites for copyright protection, the question of authorship becomes relevant. As lawyers, we will then face the question of how to approach this issue under the copyright laws. Another example: Google's intelligent car was involved in an accident in August 2011. This time, a human was responsible for the accident, but what if the autonomous vehicle had been considered responsible? How would we fit the case within the legal regime governing legal liability? The properties involved in the operations of robots are usually called Artificial Intelligence. Artificial intelligence can be defined in several ways. According to John McCarthy, artificial intelligence means the science and engineering skills related to the development of intelligent machines. Intelligence in turn refers to the ability to achieve goals. In a recent bill on autonomous vehicles adopted by the state of Nevada in the US, artificial intelligence is defined as the use of intelligence by computers and similar devices, allowing the machines to mimic and reproduce human behavior. Legally, artificial intelligence can be approached from at least two different angles. First, one can explore how applications of artificial

intelligence are used in the legal decision-making. Second, one can examine what challenges artificial intelligence poses to jurisprudence. My research will focus on the latter set of questions. I will study artificial intelligence systems in light of the current system of norms. This new technology raises new legal issues that can be partially solved by means of traditional jurisprudence. However, there will also be problems and challenges to which the current system offers few sustainable solutions. An intelligent system can be, for example, an intelligent agent or robot. An intelligent agent is a computer program that contains artificial intelligence. Intelligent agents can modify their own code and learn from their mistakes. In accordance with Peter Singer's classic definition, robots are made up of three parts. These include sensors, processors, or artificial intelligence, and actuators. Sensors monitor the environment and detect changes in it. Processors, or artificial intelligence, decide how to respond to these changes, and actuators reflect the decisions made by processors in their functioning, creating changes in the world around the robot. According to Maja Mataric's much used definition, a robot is an autonomous system, which exists in the physical world, discovers its environment, and can act in its environment in order to achieve particular goals. The intelligence of machines can be divided into three classes. First, the agent can be autonomously intelligent. In this case, a machine agent implements intelligent functions independently, without a need for human intervention. Secondly, the machine can augment human intelligence, acting in close interplay with a human. In this case intelligence is both borrowed from the human and created from human-robot interaction. Thirdly, intelligence can be analogous to swarm intelligence, i.e., multiple robots can elicit complex and intelligent behavior when interacting with each other, even if any one of the robots could be safely considered "stupid" upon individual examination. I explore the development of intelligent systems and the feasibility of the legal framework, in particular in the consumer environment. I look into copyright and legal liability issues in a problem-oriented manner. I look for the criteria by which liability issues should be resolved, and I search for points of reference, combining copyright and tort-based judicial review. My research will focus, for example, on intelligent agents that create news, music, and literary works. I will also examine household robots, such as Personal Robot 2 "PR2" developed by Willow Garage in Silicon Valley, a robot that knows how to fold the laundry and how to pick up goods from the refrigerator. I will consider regulation in Finland, the United Kingdom, the European Union and the US. The United Kingdom and the US have been chosen for review because the current information technology laws are largely based on practices evolved in these two countries. This is a problem-oriented study. The viewpoint is legal, comprising both domestic and comparative law. However, despite the importance of an international perspective, the focus is on the European and the Finnish systems. My research problems are, in particular, the following: Who is responsible for the damages caused by intelligent systems, and who holds the copyright to works created by artificial intelligence? The actors under review are the producers of the intelligent machines, the programmers of the software run on such machines, the users of the machines, their owners and the intelligent systems themselves. My purpose is to outline the various legal doctrines from among which the legislator can choose the policy to pursue de lege ferenda. My goal is to contribute to technological development process, and I find that the legal aspects of robotics should be taken into account

in the development of services and products. I also approach the research problem from the viewpoints of technology, sociology and history, and use the theory of Science and Technology Studies, STS. The study provides an overview of, for example, Bruno Latour's actor network theory (Actor-Network Theory), and discusses which kind of actors can be found behind intellectual property law and tort law. Latour's Actor-Network Theory (ANT) recognizes nonhumans as actors (agency). Günther Teubner also sees electronic agents and animals as new players in the political and legal areas. According to Latour actants are mediators and not intermediaries. Actants are equal, regardless of whether they are human or non-human creatures. This can be reflected on how the legal theory defines a legal entity and if a robot were regarded as a legal entity. I will consider whether the issues related to robots are so different from those present in other fields of technology that they require their own approach, or whether robots can be examined within the general conceptual systems of various areas of law as they currently exist. In other words, the research question is how to respond to the challenges of new technologies. Can the new policy questions be solved by the traditional means of legal interpretation, or is a new kind of approach required?

David Cohen

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Biography: David Cohen received a MS in neurosciences from the University Pierre & Marie Curie (UPMC) and the Ecole Normale Supérieure in 1987, and a MD in 1992. He specialized in child and adolescent psychiatry. He is Professor at the UPMC and head of the department of Child and Adolescent Psychiatry at La Salpêtrière hospital in Paris. He is also member of the lab Institut des systèmes Intelligents et Robotiques (CNRS UMR 7222). His group runs research programs in the field of autism and learning disabilities, childhood onset schizophrenia, catatonia and severe mood disorder. He supports a developmental and plastic view of child psychopathology, at the level of both understanding and treatment. His team proposes a multidisciplinary approach and therefore collaborates with molecular biologist, methodologist, experimental psychologist, sociologist and engineer (see http://speapsl.aphp.fr).

Abstract

Social signal processing in developmental psycho-pathology

Presented together with Dr Mohamed Chetouani.

In the field of biology, the study of bonding has been renewed by the discovery of non genetic transmission of behavioural traits through early mother-infant interaction, the role of stress hormones, oxytocin and neuropeptides, and olfactory determinants. In the field of anthropology, it was shown that bonding emancipates from olfactory determinants by the increased importance of social learning requiring multimodal sensory cues. However, the study of early interaction is complex and Social Signal Processing (SSP) can help in addressing some issues. Based on works from our group, we will show data from diverse sources (e.g. experiments, home movies) showing how SSP was used to address interaction between partners (e.g. infant, child, care giver, agent) and characteristics that participates to interpersonal exchanges (e.g. emotion, social engagement, posture imitation, shared attention).

Thierry Keller

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Biography Thierry Keller received his Dipl. Ing. degree in electrical engineering (M.Sc.E.E.) and his Doctorate (Dr. sc. Techn.) from the ETH Zurich, Switzerland in 1995 and 2001, respectively. Currently, Dr. Keller is the head of the Rehabilitation Department in Tecnalia Research & Innovation, the largest private research center in Spain. Main activities of the Rehabilitation Department are in rehabilitation and prevention, on innovation and development of novel technologies for rehabilitation robotics, tele-rehabilitation, technologies for physical and cognitive prevention, and neuroprostheses. Dr. Keller is principal investigator in national and international projects and coordinator of the EU COST action TD1006: European Network on Robotics for Neurorehabilitation. Dr. Keller is board member of the International Functional Electrical Stimulation Society (IFESS), and member of the steering committee of the International Industry Society of Advanced Rehabilitation Technologies (IISART).

Abstract **Robotics for Neurorehabilitation: Current challenges and approaches**

Neurorehabilitation specifically after stroke requires more user involvement and time than the duration of their hospitalization. Continuation of the therapy in local and smaller rehabilitation facilities and at home should follow the clinical rehabilitation. One of the current challenges for rehabilitation engineers are the implementation of affordable rehabilitation systems for outpatient centers and the development of cost effective solutions for home environments. This goal can be achieved by combining robotic devices with a tele-rehabilitation platform. They promise to maximize benefit and availability to the patient, and to simultaneously minimize long-term care costs to the health care system. Key for such platforms are the integration of all stakeholders needed for the rehabilitation success, mainly the interaction of the therapists, the family caregivers, the clinicians and the robotic systems with the patient. A rehabilitation and care continuum needs to be enabled on which social robotics components and interactions are needed. From this scenario many needs and challenges can be derived, which drive the activities of the COST Action TD 1006 ‘European Network on Robotics for Neurorehabilitation’. The main goals are: • To provide clear, evidence-based guidelines for patient selection and application of robot- aided therapy. • To coordinate research necessary for understanding factors influencing recovery processes after stroke. • To recommend desirable features of new and efficient robot-based therapies, taking into account future application scenarios (e.g. neurological conditions other than stroke, decentralized domestic tele-rehabilitation). A number of activities are currently undertaken by an

interdisciplinary group of clinicians, engineers, motor control experts and neuroscientists: • Summarize and catalogue established research results on robot-aided therapies. Formulate evidence-based guidelines for the application of robot-aided therapies in clinical practice. • Summarize and catalogue established research results on robot-aided assessment of patient capabilities. Clarify how robot-aided assessment procedures are related to existing clinical scales. • Identify disabilities and diseases for which robot-aided therapies represent potentially beneficial treatments. • Identify patient and therapy parameters, which are important for theoretical modeling of motor recovery. • Discuss the relation between models of sensorimotor learning and models of motor recovery. • Discuss results of ongoing clinical trials and experiments about the neurophysiological mechanisms of motor recovery. • Plan and coordinate future experiments and clinical trials. • Share datasets recorded in experiments studying the neurophysiological mechanisms of motor recovery. • Compile a repository of software tools for modeling motor learning and motor recovery. • Identify key features of future rehabilitation robots from an analysis of established research results, experience with clinical use of robots, and ongoing research programs. • Identify emerging technologies, which could be of use in future rehabilitation robots. • Recommend future research directions for the technological development and clinical application of rehabilitation robots. All these activities will help to make robot-mediated therapies more and more clinically used and accepted. Recognizing that two of the key barriers to quality care are therapist time and cost, and that the size of the barrier is expected to increase threefold with the coming shift in the demographic profile, new robotics treatment tools and modalities to further increase the efficiency and availability of rehabilitation and care are needed at a global level. However to be able to achieve full acceptance of robot-mediated therapy requires social acceptance and integration in addition to clinical evidence. Here an additional focus needs to be considered on which the community of social scientists is invited to contribute.

Paolo Dario

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Biography Paolo Dario is a Professor of Biomedical Engineering and Director of The BioRobotics Institute of the Scuola Superiore Sant'Anna (SSSA), Pisa, Italy. He received his Dr. Eng. Degree in Mechanical Engineering from the University of Pisa, Italy, in 1977 and pursued postgraduate education with fellowships at Brown University, Providence, RI, and at the University of Pennsylvania, Philadelphia, USA. Paolo Dario is Visiting Professor at Zhejiang University, Hangzhou, and Tianjin University, China. He has been Visiting Professor and Researcher at Brown University, at the Collège de France and at the Ecole Normale Supérieure de Cachan, France, at Waseda University, Tokyo, Japan, and at the École Polytechnique Fédérale de Lausanne (EPFL), Lausanne, Switzerland. He is Fellow of the University of Tokyo, Japan. Paolo Dario is the editor of two books on the subject of robotics, and the author of more than 500 scientific papers (250 on ISI journals).

Abstract **Robot Companions for Citizens: a Vision to Address Societal Challenges and to Improve Quality of Life**

Aude Billard

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Biography Aude Billard is Associate Professor and head of the Learning Algorithms and Systems Laboratory (LASA) at the School of Engineering at the EPFL. She received a M.Sc. in Physics from EPFL (1995), a MSc. in Knowledge-based Systems (1996) and a Ph.D. in Artificial Intelligence (1998) from the University of Edinburgh. She received the Swiss National Science Foundation career award in 2002 and the Intel Corporation Teaching award in 2001. Aude Billard served as an elected member of the Administrative Committee of the IEEE Robotics and Automation society for two terms (2006-2008 and 2009-2011). She was a keynote speaker at the IEEE International Symposium on Human-Robot Interaction (ROMAN) in 2005 and the IEEE-RAS International Conference on Robotics and Automation (ICRA) in 2013. She served as general chair for the IEEE Int. Conf. on Human-Robot Interaction in 2011 and co-general chair at the IEEE Int. Conf. on Humanoid Robots in 2006.

Abstract **Issues when transferring knowledge from humans to robots**

This talk will briefly review a number of issues arising when transferring information from humans to robots. We will discuss the correspondence problem and its influence on the choice of interface. We will also look at means by which information on force control can be transferred in an easy and intuitive manner.

Alessandro Vinciarelli

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Biography Alessandro Vinciarelli (www.dcs.gla.ac.uk/~vincia) is Lecturer at the University of Glasgow (UK) and Senior Researcher at the Idiap Research Institute (Switzerland). His main research interest is in Social Signal Processing, the domain aimed at modelling analysis and synthesis of nonverbal behaviour in social interactions. Overall, Alessandro has published more than 80 works (h-index=24, 1800+ citations). He has participated in the organization of the IEEE International Conference on Social Computing as a Program Chair in 2011 and as a General Chair in 2012, he has initiated and chaired a large number of international workshops. Furthermore, Alessandro is or has been Principal Investigator of several national and international projects, including a European Network of Excellence (the SSPNet, www.sspnet.eu). Last, but not least, Alessandro is co-founder of Klewel (www.klewel.com), a knowledge management company recognized with several awards.

Abstract **Social Signal Processing**

Social Signal Processing is the domain aimed at modelling, analysis and synthesis of nonverbal communication in human-human and human-machine interactions. The talk will introduce the basic principles of the domain and will illustrate their application through two main examples, namely Automatic Personality Perception and Automatic Conflict Detection and Measurement. The presentation will pay particular attention to interdisciplinary aspects and potential applications in robotics.

Working Group Chairs

James E. Katz

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Biography James E. Katz, Ph.D., is the Feld Professor of Emerging Media at Boston University's College of Communication. In addition, he directs its Division of Emerging Media Studies. The Division addresses the process of how new media technologies are created and introduced to users, the effects they have on users, and how technologies and the content they produce are molded, co-constructed and re-constructed by users. Dr. Katz joins BU from Rutgers University where he held the title of Board of Governors Professor of Communication, the highest honor the University can bestow on a member of its faculty. During his time at Rutgers, Katz served two terms as chair of the Department of Communication and also directed the Center for Mobile Communication Studies, which he founded in 2004. Earlier in his career, Dr. Katz headed the social science research unit at Bell Communications Research, which also honored him with the title of Distinguished Member of Staff. Dr. Katz has devoted his career to analyzing the uses and social consequences of emerging communication technologies, especially the Internet and telephone. He explores how they affect social interaction and what their uses reveal about human nature and organizations and was among the first to demonstrate their pro-social uses. He also seeks to understand what the future holds in terms of society and communication technologies and works with others to explore ways in which society can best prepare itself to make the optimal use of new developments.

Abstract **Attitudes toward robots suitability for various jobs as affected robot appearance**

An opinion survey of 878 college students conducted in 2011 examined attitudes about the suitability of robots for various occupations in society and how these attitudes varied by the robots' appearance. Factor analyses revealed three primary attitudes: Robot-Liking, Robotphobia and Cyber-Dystopianism, and three occupational niches: social-companionship, surveillance and personal assistants. Attitudes varied depending on subjects' gender, religion, perceived competence with technologies and engagement with virtual reality environments and avatars. Analysis of relationships between subjects' attitudes and perception of suitable occupations indicated that Robot-Liking is positively related with social-companionship and surveillance occupations, whereas Robotphobia negatively correlated with the three occupational niches.

Ryad Chellali

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Biography Ryad Chellali is a senior scientist at the Department Pattern Analysis and Computer Vision (PAVIS), Istituto Italiano di Tecnologia. He obtained his PhD in Robotics from University of Paris in 1993 and his Dr. Sc from Univesrity of Nantes (France) in 2005. His main research interests include robotics, human robots interactions, human behavior analysis (social signal processing and a
ffective computing). Telepresence virtual and augmented realities, are also keywords of his activity. He worked in 1992 at the French Institute of Transports (INRETS). From 1993 to 1995 he was ass-prof at University of Paris. From 1995 to 2006, he joined Ecole des Mines de Nantes(France), heading the automatic control chair. He joined IIT in 2006 as a senior scientist, where he created the Human-Robots Mediated Interactions Lab. Ryad Chellali co-authored more than 100 papers. In 2000 and 2005 he was awarded by the French Government "Creation of innovative technologies".

Abstract **The Social Robot: myths, reality and perspectives**

The engineering approach to find working solutions is a three steps process: what, why and how. Indeed, for an engineer to promote their work, he or she follows the known convincing sequence: What is the problem you want to solve, why your solution is/will be unique, and finally you show that your solution is/will work, is robust and cost-effective. For social robotics, we know why we need social robots: they could help elderly or disabled people, in terms of their social lives, etc. On the other hand, we invent some toys problem (simplified problems solved under controlled conditions) to convince others (and ourselves) that social robots can work (the HOW). Importantly only few of us can specify exactly what is a social robot. There is no absolute need to define “social robotics” and it seems that it is also not absolutely necessary to define the means to demonstrate that our research will lead to effective solutions. However, we have to keep in mind that two fundamental questions are pending. My presentation starts by listing some of the myths in and around robotics, in order to understand the current state of robotics. I continue with describing my own experiences in addressing problems of human-machines interactions. I finish with my vision of the future of the social robotics and the means to achieve the specified ends. Myths in and about robotics Before addressing the robotics myths, I first introduce some historical facts about artificial intelligence and control theory and their relations to robotics. Indeed, AI suffered and is still suffering since its origins. In the 50’s a group of researchers established a roadmap for developing this field for the following 20 years. AI was considered as the absolute way to solve any kind of problem, far beyond human capabilities. Robots at that time were

considered no more than printers: just a terminal allowing displaying the power of AI. The 50’s roadmap was in fact lacking at least two crucial points: i) that intelligence needs embodiment; ii) that similar problems may have a variety of alternative solutions. The first point discarded de facto all the developmental/evolutionary aspects of a system working within physical environments. The second point delayed all the stochastic and bio-inspired approaches from being used as successful solutions to handle complex and real-life systems. The second myth in robotics is related to the control theory. This theory, given a model of the world, allows generating optimal controls to command any dynamic system and make this system perform exactly as predicted or desired. This theory worked perfectly for simple and simplified worlds (with hundreds of state variables), however it fails when facing complexity, mainly, when humans are present in the control loop. The list of myths is non-exhaustive and we can continue by pointing out the way existing theories have been misused. Such a list, however, enables addressing the specific problem of our interest: the human-robot hybrid system. Current general trends in robotics contrast with previous approaches. Robots are today the central objects of research: we develop and adapt techniques and methodologies for the robot itself rather than using it as a demonstration platform. This shift allows crystallizing efforts on a single technological object and enables performing a vast amount of research leading to many fundamental and practical advances. However, roboticists should keep in mind that these successes are also the fruits of the continuous cross-fertilization and inspiration across disciplines. Some experiences I'll give two types of collaborations I have had in the past. From each, I got different outputs and lessons about the necessity of addressing the SR issues within cross-disciplinary frameworks. The first example is concerned with the work we have done with Neuroscientists, and specifically from neuroscientists dealing with motor control, to investigate sensory-motor coupling in reaching for objects. This research showed us that the embodiment is a key aspect, and coupling of perception and motor control could improve our understanding of how motor actions improve perception. It took 3 years before obtaining the first results. Most of this time was dedicated to understanding each other’s approaches and to have clear ideas about mutual expectations. Last piece of research has been done with colleagues from experimental cognitive psychology. We joined our efforts to answer a simple but fundamental question: does the robot’s shape affect the way humans represent robot actions? Beyond the research-line itself, the principal success is the fact that after years of discussions and exchanges, we found, after three years a common language to address exactly the same key question from different angles; rather than having representatives of each of the discipline tackling different questions without a common overarching line of thought. I’m convinced that most of people addressing issues related to social robotics experienced similar situations and found that multi-disciplinary ways are the most effective. The manifold approaches developed by SR community are nowadays a reality and should be strongly encouraged. However, one should be aware that this is an iterative process, which needs time. The future of social robotics Social robotics is in its infancy and needs to be strongly stated as a research discipline. SR, by essence, investigates humans in the presence of robots (e.g, the robot as stimuli generator), or robots interacting with humans (e.g. HRI). There is a clear dichotomy of studying separately

robots on the one hand and humans on the other in addressing SR issues and this is reflected in the literature (conferences, journals, etc.). SR should shift to a new paradigma: the human-robot system as a central research topic. This idea itself is not new and many similar ideas have been proposed in the past. However, considering the HR system as a whole: a unique system treated as a unit of examination, should remove confusions, redundancies and should open doors to new fundamental questions. Mixing different research areas in a well-organized way will be the key of success for SR. We have in mind many of the domains that should be involved at different levels: Sensing, data-mining, signal processing, machine learning, statistics, control, mechatronics, design, cognitive sciences, psychology, experimental psychology, cognitive psychology, neurosciences, neuro-cognition, neurophysiology, motor control, developmental sciences, linguistics, social sciences, material sciences, etc. This list is an open one and has to be filled and extended to new topics. The efforts in developing SR should consider at least two main directions: 1) Developing a strong and open community, 2) Grounding the scientific foundations of SR. a) Some ideas to develop the SR community Classical communication tools should be setup to allow potential contributors to be involved in the development of the community (datasets, websites, dedicated workshops). b) Some other ideas to strengthen common scientific basement of SR Here also, SR community should develop usual paths toward creating the right ecosystem allowing having fast and fruitful exchanges. • Encouraging the creation of a “common language” through summer schools, • Creation Open sources repository.

Alessandro Saffiotti

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Biography Alessandro Saffiotti is full professor of Computer Science at the University of Orebro, Sweden, where he heads the AASS Cognitive Robotic Systems laboratory. He holds a MSc in Computer Science from the University of Pisa, Italy, and a PhD in Applied Science from the Universite Libre de Bruxelles, Belgium. His research interests encompass artificial intelligence, autonomous robotics, and technology for elderly people. He is the inventor of the notion of "Ecology of physically embedded intelligent systems", a new approach to include robotic technologies in everyday life. This approach is currently applied to the domain of elderly assistance in the EU project Robot-Era. He has published more than 140 papers in international journals and conferences, and organized many international events. In 2005 he was a program chair of IJCAI, the premier conference on Artificial Intelligence. He is involved in four EU FP7 projects, in several EU networks, and in many national projects.

Abstract **Toward a human-robots-environment ecosystem: opportunities and challenges**

In response to the current demographic changes, the field of robotics is putting a growing emphasis on the development of robotic technologies suitable to provide assistance to elderly people, and to improve their independence and quality of life. Many of the current efforts in assistive robotics concentrate on the development of powerful robotic devices able to perform domestic chores or domestic assistive tasks, often mimiking the peformance of a human assistance. In this presentation, I argue that a redirection of this effort is needed in three aspects. First, to put a stronger attention on the service level, that is, the identification of the services which would really make robots added value devices. Second, to replace the vision of a powerful, autonomous single-robot device should be replaced by an ecosystem of robotic devices, where devices can be dynamically added and removed, and can cooperate to collectively produce the required services. Third, to extend this vision beyond the domestic boundaries, to create an ecosystem of robotic devices pervasively distributed in the houses, shops, streets and public places. This ecosystem should provide everywhere assistance to the senior citizens at all levels, from the homes to the town. The above perspective will be illustrated in the context of the Robot-Era EU project. I will discuss the Robot-Era concept, its user-centered development approach, and some of the interesting technical challenges and solutions which are being developed in that framework.

Harmeet Sawhney

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Biography	Harmeet Sawhney is Professor and Director of Graduate Studies in the Department of Telecommunications at Indiana University, Bloomington. His research interests include telecommunications infrastructure planning and policy, evolution of telecommunications networks, and the use of metaphors in the design of new technological systems. He is currently serving as the Editor-in-Chief of The Information Society.

Guglielmo Tamburrini

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Biography

Guglielmo Tamburrini is Professor of philosophy of science at University of Naples “Federico II”. His research interests include methodology and epistemology of robotics, human-robot interaction, ICT and cognitive neurosciences.

Sara Rosenblum

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Biography Sara Rosenblum is an associate professor in occupational therapy and head the laboratory for Complex Human Activity and Participation (CHAP), with special interest in the characteristics of human daily function. Rosenblum aim to gain better insight into interactions between varied body functions (e.g., cognitive, motor, sensory), activity performance and participation abilities of people faced with functional deficits in everyday life. A main focus is placed on trying to understand the relationships between brain mechanisms and actual daily functions among varied populations along life cycle. The ICF concepts (WHO, 2001) constitute the frame for description and evaluation of ability and disability in her research. Consequently, her studies concentrate on populations of children and adults with Hidden disabilities such as ADHD, DCD, LD, and those with chronic illness whose daily function confrontations have not yet received appropriate expression in research.

Abstract **Brain-hand language secrets as reflected through a computerized system**

Brain-hand language secrets as reflected through a computerized system and their possible contribution to the field of social robotics. The field of social robotics is in its developing stage while questions regarding how to design and build social robots are being discussed. Consequently, there is no clear insight as to the possible impacts of this development on the therapeutic domain area, although some literature describes robot therapy for people with special needs. In this context, interdisciplinary research which combines diverse sources of knowledge may enrich the development process of social robotics. The aim of this presentation is to exhibit knowledge acquired within the occupation science concerning human performance characteristics of participants with ‘clumsiness’ diagnosed by the DSM4 as Developmental Coordination Disorders (DCD). Specifically, features of children's and adults with DCD performance of a specific task which reflects brain-hand language, in other words, handwriting, will be presented. Information about their handwriting performance features was gathered using the Computerised Penmanship Evaluation Tool (ComPET) which detects the writing process, as well as supplementary self report questionnaires. Studies were conducted with 180 participants, 90 children and adults with DCD compared to 90 children and adults with Typical Development (TD). Results indicated that the temporal spatial and pressure measures of participants with DCD handwriting performance differed significantly from those of TD participants. Furthermore, several handwriting features predicted their Activities of Daily Living (ADL) performance level. Results such as these shed light on the meaning of motor coordination deficits to participants with DCD (clumsiness) daily function and may constitute a

source of knowledge for social robotic development to improve their motor function, automaticity and control. Furthermore, it may particularly contribute to improving handwriting performance enabling more effective brain hand language expression. Possible implications for the social robotics field will be described with focus on use of computerised information to develop robots for evaluation and therapeutic intervention among children and adults with DCD, aimed to improve their achievements and quality of life.

Maria Bakardjieva

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Biography Maria Bakardjieva is Professor in the Department of Communication and Culture, University of Calgary, Canada. Maria is the editor-in-chief of the Journal of Computer-Mediated Communication. Her research has examined Internet use practices across different social and cultural context with a focus on the ways in which users understand and actively appropriate new media. Her work on the topics of Internet use in everyday life, online community, e-learning and research ethics has been published in numerous international journals and edited collections. Her current projects look at the interactions between traditional and new media with a view to identifying opportunities for citizen participation in the public sphere.

Abstract

This bot hurt my feelings: Ethics and politics for social bots

As individuals amass friends, update status and ‘groom’ relationships on social media sites, the labour of socializing and maintaining networks gradually becomes too much to bear. A typical human response to unbearable labour throughout history has been first mechanization, and consequently automation. The mechanization stage on Web 2.0 has arrived in the form of simple one-click responses, recorded phrases, like and dislike icons. While we’re employing social machines like this, the individual operator still has to exert the effort to select, to navigate, to click, or put together a three-syllable tweet. The next stage is just around the corner. Some say it is already here. The automation of social communication promises relief from the burden of reading our friends’ posts or spending time in our day to maintain web presence. Social bots offer to do it for us. When sociality is based on simple reactions and quantification, robots come to offer a logical solution. The more our human friends behave like robots, the more likely are robots to displace our human friends. If we do not know that all the support or approval we have received for our posts online has come from automated agents, we might feel happy and comfortable just as well. With automated sociability looming on the horizon, the issues of integrity, deceit, betrayal, confidentiality breach, and a whole host of other ethical standards applying to relationships between people are going to arise with regard to social bots. Ethics is closely followed by politics. When social bots start signing petitions, voting in online referenda, following politicians’ tweets, posting in political forums, etc., the online representation of political life could be severely distorted. This presentation will reflect on what all these possibilities mean for the design of social bots and what the place of ethics and politics should be in the process.

Valéria Csépe

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Biography Valéria Csépe is distinguished professor of the Institute of Cognitive Neuroscience and Psychology at the RCNS HAS. In 1990-92 she worked as Humboldt scholar at the University of Münster. Her recent research interest includes the neural processing of acoustic patterns and that of spatial information (real and virtual environment). She is d She has more than 200 publications in English and Hungarian. She is member of many national and international scientific organizations, and editorial boards of scientific journals. Since 2012 she is member of the ICSU CSPR. She has been decorated with different awards for outstanding scientific achievement. She is corresponding member of the Hungarian Academy of Sciences. She was elected in 2008 and in 2011 for a second term as deputy secretary general becoming the first female chief executive officer of HAS.

Abstract **Augmented reality and assisted perception**

Augmented reality and assisted perception Valéria Csépe, Ágoston Török and Ferenc Honbolygó Institute of Cognitive Neuroscience and Psychology, Research Centre of Natural Sciences of the Hungarian Academy of Sciences csepe.valeria@ttk.mta.hu Augmented Reality (AR) is a broadly used expression for the creation of environment of real word view (RWV) based on digital information. As a consequence of intensive technological development, AR moved from the tracking toolkits' area of context-aware methods to new approaches in human-computer interactions. Although AR evoked a particular attention of engeneering, the knowledge of disciplines on human behavior and the cognitive architecture changing from childhood to the end of adulthood characterised by modified profiles is still not well represented in planning and designing the new methods and devices. However, if an application of the AR broader than the one used nowdays in the areas of entertainment, travel, advertisment and social communication is expected , developers have to take into account the knowledge accumulated in a multidisciplinary area called cognitive sciences that emerged decades ago and growing rapidly in recent years. Withi the broad field of cognitive siences psychology has a crucial role in having question, irrespectively the technology - AR or VR (virtual reality) the latter with less varied media representation – about the cognitive profile including perception influencing the human behavior in AR or VR. Moreover, there is acricial question arising recently that is the assumed similarity of the reality and its virtual counterpart as the platform of cognitive processes influencing and mediating the human behavior. As the human factors are very often the part of the evaluation only, it's time to draw the developers' attention to the importance the human cognitive system investigated with methods of the cognitive psychology,

linguistics, neuroscience and involve the state of the art knowledge of the cognitive infocommunication in the research and technological development. The first trials have already been made, especially what concerns the visual modality including the investigation of visual augmentation. A very recent focus of the developers is the 3D space as well as the online operations done by human participants in VR environments. It is more than clear for many developers, that not only the visual spatial perception should be taken into account when designing 3D applications especially what concerns animations resembling the real environment. Spatial cognition is more than just visual, the processing of acoustic space including spatial characteristics of speech is processed by the human brain in integration with the visual one and this should be taken into account. During the last 2-3 years cognitive psychology and neuroscience started to focus on measuring online the human spatial cognition in VR. There are not too many data at the moment, although one can expect a data explosion soon due to to the rapid development of high tech devices . On the same time we better keep in mind that cognitive psychology and infocommunication can break through a field barrier with combining VR and experimental cognitive psychology. Our research group in collaboration with a research group of the Aix-Marseille Université, CNRS (VISIONAIR 262044 project) investigated the audio source localization ability by measuring the participants' performance in multimodal situations (Török et al, submitted). The experiments' main objective was to study how surround systems may support the visualization and creation of near-realistic perceptual situations. The participants had to localise sound sources occurring synchronously with vertically displaced visual distractors. The results showed how the visual distractor position affected the subjects' localization judgements, especially in case of sounds presented centrally. In a further experiment sounds and visual distractors with horizontal offsets were presented in order to see how the visual distractors affected the sound localization for sounds presented in the center. Our results highlight the importance of visual capture and multimodal stimulation to prevent perceptual changes caused by imperfection of sound source modelling.

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Biography: Her background is in Electrical and Electronic Engineering and PhD in Computer Vision. She is professor at the Technical University of Catalonia (UPC), in the Automatic Control and Computer Engineering Department. She is currently leading the research group on Robotics and Medical Imaging program of the Institute for Biomedical Engineering of Catalonia (IBEC). Her research field is in robotic systems and control strategies for rehabilitation, assistance and surgical applications. Responsibilities: 2001 to 2008 Coordinator of the Education and Training key area within Euron, European Robotics Network, 2008-2009 IEEE-Robotics and Automation Vice President for Membership. Main awards: International Award on Technology, Barcelona'92, Barcelona City Award 1998 (Barcelona City_Hall), and Narcis Monturiol Medal from the Catalan Government as recognition of the research trajectory 1999. From 2007 Prof. Casals is member of the Institut d'Estudis Catalans, the Academy of Catalonia.

Abstract

Social acceptance factors in robotics for health

As robots have been widening its scope, moving from industry to hazardous environments, to services, leisure and entertainment, and even to personal and medical assistance, the need of endowing them with some kind of "human qualities" arises. The interaction of humans and robots demands flexible behaviors, so that robots adapt to the human needs and dynamically to the situation requirements. If conceived for professional use, robots must provide an added value through their effective, reliable and safe operation. But if they are oriented to personal use, leisure, assistance or care, they should offer additional performances, behave in accordance to the users' will and in the way users may expect they should react to any situation. Thus, social robots should appear friendly and behave compliantly, cooperatively and if it applies, showing some comradeship. This more human like behavior requires, among other performances, various levels of perception, decision making and planning capabilities, cosmetic appearance, compliant behavior and a friendly interface to be understandable and usable for elder and non-specialists. Therefore, besides being provided with the necessary sensing modalities this information has to be adequately processed to interpret the operating environment, the evolution of the task or process, and through the human –robot interaction system, interpret human intention, human will and the suitability to cooperate. That is, endow the robot with some kind of "human qualities". However, the diversity of natural environment conditions and their complexity impedes achieving a robust enough interpretation or disambiguate among different environment situations,

human actions, objects with which to interact, etc. Thus, additional information may be required that can come from the knowledge of the evolution of the task going on through an analysis of both, human and workflow activity. The increasing requirements of these more and more demanding social needs may lead to complex and costly social robots and robotic systems, which may result in an economically unsustainable manufacturing. Thus, the goal of this talk is to analyze in the area of robotics for health, comprising the fields of surgery, assistance and rehabilitation, the current situation of robotics and foresee how robotic systems should evolve towards this end that is, becoming assistance machines, invisible assistants or collaborative and assistant mates. With this aim, in this talk the three kinds of barriers that prevent the spreading of robots in the wide scope of services, focusing mainly to health, will be evaluated. These barriers are: technological difficulties, formal issues and user's acceptability. Technological difficulties can present quite different levels as technical aids range from very simple devices to extremely challenging systems, and among the latter, some difficulties may depend on the burden of bulky and costly systems or on the still unsolved technical solutions. For this reason an evaluation of some current robotic aids will show design criteria and their cost-effective results. Dealing with robots interacting with humans, special efforts should be devoted to evaluate the compromise between the required robot assistance and the potential degree of cooperation so as to extract the best of human –robot synergies. The design of sustainable solutions as robots spread around will be another aspect to be considered. Referring to formal issues, here we refer to administrative and legal aspects which unfortunately are creating fictitious barriers that lead to unreasonable orientation of research, development and marketing efforts. Besides administrative and legal aspects that should adapt to the progress of technology, as current robots are very different from former manufacturing machines, other factors as the overwhelming of patents is an factor to be taken into account. Patents range from those reasonably protecting technology that results from serious research, to many others which are abusive without presenting any real innovation, those that just try to prevent new technological and improved developments in order to protect interests of some lobbies against the interest of society. And finally, referring to acceptability, the analysis of current robotics applied to health will be the base of discussion on how to approach users offering them just what they need in what refers both to the service or assistance offered and to its acceptability. In the medical area, as in other areas, acceptability refers to usability, robot appearance, cost-effectiveness and ease of use, matters to be dealt with along the talk.

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